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U.S. Food Distribution Administration

COMMUNITY  
FOOD PRESERVATION  
CENTERS

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NATIONAL WARTIME COMMUNITY FOOD PRESERVATION

Community food preservation--families getting together in a neighborly way to can, brine, preserve, or store an oversupply for a coming need--is as old as America and as new as all-out war effort.

In normal, peaceful years, it is one of this country's thrifty means of securing an all-the-year-round supply of good food. It has been proved a good way of tiding over droughts and depressions and meeting such food emergencies as are caused by floods and hurricanes. Now comes a new chapter in the food preservation story, the rallying of all America to conserve the Nation-building food supply as a vital part of our war effort. It is imperative that no produce be wasted if we are to meet the processed food demands of our armed forces, our allies, and the peoples of liberated countries, as well as our own civilian needs. Consequently, individuals and communities are being urged to make every effort to conserve all available supplies of perishable foods and thus avoid wastage.

WHAT THE FOOD PRESERVATION PROGRAM MEANS

For the family.--Food preservation is an essential part of an all-the-year-round home food plan which will keep family members as healthy in January as in garden-growing June. Any family now can get expert advice on budgeting foods for nutritional needs.

For the community.--Community food preservation programs are a part of a nationwide plan to conserve food. This may be done by forming informal community canning circles, where the pressure canner goes around and families swap notes on other food preservation methods. It may mean families getting together for community locker storage. If community fruit and vegetable surpluses are large, it may mean the setting up of permanent or temporary community food preservation centers, with a paid supervisor or manager, the keeping of competent records, the conducting of canning operations according to accepted standards of processing, safety, and sanitation, and serving as information clearing house or actual base of operations for distributing fresh surpluses, or for drying, freezing, and other means of storage. Community upbuilding has been quickly evident when such food preservation has been undertaken.

For the State.--In every State there is available from some source a suggested food budget. This describes the home food-supply program on the basis of the home State products and often furnishes suggested diet plans by which the people can find out whether or not their home food measures up to a satisfactory level of nutrition. Often families definitely "sign up" for a program which includes doing their share of food preservation, and receive certificates of recognition for a year's work well done.

For the Nation.--The purpose of the wartime community food preservation program is to save all possible food. Community programs of this type give families practice in group action, so that if an emergency arises they know how to work together.

The Federal Government feels that this work is so important that wherever it is possible they are extending help through suitable local channels.

### This Handbook's Place in the Picture

This handbook is designed to help in community food preservation, particularly when it becomes a big enough project to call for setting up a center. Such a project presents a real problem and cannot be considered merely as doing on a larger scale the same things that are being done at home. Competent supervision and businesslike methods are absolutely essential to success.

### LEADERSHIP

Never before in our history has this country been so well organized to furnish competent leadership for community food preservation centers. Nutrition committees are set up to do over-all planning on the long-range object of these centers--the upbuilding of the national strength through better use of food supplies. Government agencies or the vocational schools are in a position to help secure equipment and give technical advice in setting up and operating a plant. The civilian defense organization enrolls volunteers for service in food conservation. Communities have their women's clubs, civic clubs, youth groups, consumers' organizations, labor unions, to help solve financing and transportation problems as well as supervisors and volunteer workers. Instruction in canning and preserving is given in rural areas by home demonstration agents, home supervisors, and vocational agriculture and vocational home economics teachers. Initiative for setting up a center may be taken by some one interested individual--such as a civic leader--or a public-spirited group. Usually it is wise to work with and enlarge what already is set up instead of starting new.

### SUPERVISING THE CENTER

It would be impossible to lay too much stress on the necessity of competent supervision of community food preservation centers. If untrained persons are assembled to work with perishable foods and to use unfamiliar equipment without expert guidance and control, there is certain to be waste of material and time. And there is grave danger of menace to health through the botulinus poisoning that may arise in meats and nonacid vegetables when improperly processed.

Competent supervision means a smooth-running plant, high morale of workers, all operations well done. The success of the project and the product lies, in large measure, in supervision. Know what you are looking for in a supervisor or manager. Know where to look for a trained, experienced and competent person.

### Supervisor or Manager

Qualifications.--Competence in the person in charge of a community food preservation center means technical food preservation knowledge and experience, business ability, and personal integrity.



If a skilled mechanic or engineer is not available, the supervisor of a preservation center must have a sound working and maintenance knowledge of the equipment used.

Other qualifications necessary to success of the center are: Ability to maintain harmonious working relationships with others since the supervisor or manager must work harmoniously both with the advisory board and the community using the center; ability to direct others and follow directions; enthusiasm, initiative, good judgment; ability to meet emergencies.

Where to Look.--Such qualifications are likely to be found among former home demonstration agents, former home economics teachers, former commercial canners, and the canners trained in the former WPA canning program. If funds permit of a supervisor and assistant supervisor, it is often of advantage to have one of them a man with some engineering experience or a skilled mechanic to aid with setting up equipment and repair and maintenance of heavy-duty machines.

### Training Possibilities

Food preservation cannot be done by inexperienced people any more than food can be distributed in trucks by people who have never been behind a driver's wheel. In either instance, there are plenty of people in the United States who can teach the inexperienced. Down through the years, home demonstration agents have turned out a large crop of crack canners and preservers who can do a thoroughly competent job of teaching their neighbors. The former WPA canning program and the FSA farm- and home-management program have added hundreds more. Teachers of vocational agriculture and home economics in public schools, and the home economics and agriculture courses in State agricultural colleges, offer formal instruction and a source of supply of teachers, as well as of center supervisors.

### Health and Safety Precautions

Health.--The health of the consumer of the product should be protected. Community food preservation centers should ask cooperation of local health officers, for regulations for people handling food, and for plant inspection if possible, laundry should be done outside the center.

Health of workers should be protected likewise. Overheating is the greatest danger in canning centers. A thermometer should be available at all times for registering room temperatures of working stations, and regular checks of such temperatures should be made. People engaged in hot work need to drink lots of water. A sanitary drinking fountain or individual paper cups for drinking water for the workers must be provided. Ten-grain salt tablets should be made available in a suitable dispenser attached to the water fountain. The use of a common dipper, cup, or glass must never be tolerated.

Safety.--The nature of canning operations calls for careful observation of all safety practices if accidents are to be prevented. Precautions to be particularly observed follow:

Manufacturers' directions for installing, operating, and cleaning all cannery equipment should be closely followed.

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All retorts, boilers, pressure canners, and other equipment should be tested frequently.

Only trained, experienced workers should operate retorts, pressure canners, and other steam equipment and mechanical devices of all kinds.

All slicing or chopping of products should be done on a cutting board if mechanical equipment is not used for this purpose.

Every precaution should be taken against slipping on wet floors. Floors should be frequently mopped and kept free from peelings and other particles of food.

Precautions should be taken against burns from steam, hot water, and hot containers.

First-aid kit: A standard first-aid kit must be in readiness, and the services of a person certified as competent to administer first aid must be available to all workers. All injuries sustained by workers while in line of duty should be reported in accordance with prescribed procedure of the State. A special tannic acid burn kit should be furnished for large plants and those using steam boilers.

#### Deciding Type of Centers

Community food preservation centers now in operation, range all the way from homes with a base of neighborhood operations in the back yard to former commercial canning and refrigerator plants that have been taken over by the community. They include use of church and community kitchens and home economics laboratories, converted store buildings, laundries, and creameries. In one State so many communities have built their own plants that the State agricultural college sends out a pamphlet of building plans, based on practical experience. Equipment ranges from home-size pressure cookers and vats made by the local blacksmith to hotel- and factory-size retorts.

When the center is being set up it should be kept in mind that to give the most value to the community it should be a clearing house for all information that will help families with their food problems from planning, production and the conservation to serving the most nutritive values in the three good meals a day.

Starting small and growing large is a good American way of doing things. Many a center has started in an old store building and grown so large it built a home of its own.

Scope.—Your center may be set up to serve families who want to bring their own produce in and preserve it themselves. It may be one in which volunteers will work for the school or for the community as a whole. Or its workers may preserve for themselves and leave part of their produce to help others. Any canned food retained by the community plant will need meet the present regulations governing the distribution of all canned foods.

Equipment.--When institutional or hotel size equipment can be obtained it should be used for community canning. Home canning equipment was not designed to stand the load of a community canning plant. The number of containers processed daily in a plant is an important factor in the size and amount of equipment needed. Having figured out the equipment needed, find out how much of it you can get the use of on a loan or donation basis; how much you can have home-made; how much you will have to buy. In the field of home-made equipment, the ingenuity of the American people can have full swing.

Other Expenses.--Thinking all the way through the project as you are planning to set it up will indicate your overhead, upkeep, and running expenses--light, heat, servicing, even the books to keep the records and paper slips to hand out to the customers when they bring their products in.

### Physical Set-up of Center

The location of a canning unit or plant should be within the shortest possible distance of the growing areas so that delivery of produce may be made economically and rapidly.

Building Requirements.--The building which is to house a canning unit should afford space sufficient to provide for the necessary equipment and facilities so that production of the highest quality may be accomplished with the minimum expenditure of time, labor, and money. This building should be sound and in good condition. The floors should be preferably of smooth concrete with facilities for draining so that they may be washed and flushed with ease. The walls and ceilings should be light in color and have a smooth washable finish which is not affected by steam and may easily be kept clean. Places where at least part of the equipment is already installed naturally should have first consideration. In a number of places the operator of a canning plant has permitted the use of his plant at a season when it was shut down or during certain hours when he was not using it. Community kitchens and home economics laboratories in the schools may be pressed into emergency use. If empty store buildings are available, they can be satisfactorily converted. In one instance, a butcher shop was used, its built-in refrigeration plant making it possible to keep fresh foods in good condition for distribution and for canning. Building a screened porch on some available building for outdoor peeling, husking, and washing has proved practical in many places.

The production line is the shortest distance between raw material and finished product. In equipping the food preservation center, see to it that there is a smooth flow of people and processes from the front receiving desk to the storage room. Chief operations or work stations along this line will be:

For Business Operations.--A place for receiving and checking products, for routing them if they are to be distributed fresh, and for keeping records and accounts. Bulletin boards for food and health posters and a circulating library of pamphlets on various methods of food preservation may well be linked up with this front-office part of the community venture.

For Canning Preparations.--A place for removing and disposing of husks, stems, and other gross waste; washing products to be processed, grading and preparing products.



For Steps In Canning.--<sup>exhausting</sup> Blanching or precooking products to be canned; fill-<sup>marking or labeling</sup> ing products into containers; sealing tin cans; processing nonacid products in pressure canner and fruits and tomatoes in water bath; cooling tin cans in running water and glass jars in air, out of draft.

For Marking, Inspection, and Storage.--~~Stamping on identification and looking~~ each can over preparatory to storage or distribution. Plan storage in a cool dry place. <sup>for spoilage</sup>

For Plant Maintenance.--Supplies and equipment must be at hand for the daily cleaning-up, inside and outside. Posters telling what is expected of workers in respect to keeping the plant clean and sanitary are a means of maintaining high morale.

### Other Requirements

Water Supply.--Running water is a minimum requirement because of the large amount of water needed for safe and efficient operation of a canning unit. It is desirable that hot as well as cold running water be provided. Water must be from a supply approved by the State Department of Health. If a regularly tested community supply is not available, arrangements should be made for water tests before a unit is put into operation and at frequent intervals thereafter. Water should also be analyzed for lime and alkali content so that the proper boiler compound may be procured if a semi-commercial unit is to be operated.

Lighting.--All work areas in a canning unit should be well lighted. Natural light is desirable but artificial lighting should be provided for dark days. Provision should be made for regulating sunlight and for preventing glare.

Ventilation.--This is particularly important on canning units because of the amount of heat and steam generated. A room with windows on more than one side to provide cross ventilation is desirable. If windows are not sufficient to provide for good circulation of air, ventilating fans should be used. Inside rooms are not suitable for canning units unless adequate mechanical ventilation is provided. It is well to consider prevailing winds when providing for ventilation or making plans for remodeling or building a canning plant.

Sanitation.--All state and local regulations pertaining to canneries or to food handling establishments must be met. Where such regulations cannot be applied, as may be the case in small rural canning units, or where there are no strictly defined regulations, the assistance of the State Department of Health should be sought in establishing adequate standards of sanitation.

Sewage.--Where there is no sewage system the disposal of waste is subject to approval by local health authorities.

Refuse Disposal.--Fruit and vegetable parings and other refuse should be removed from the preparation area at frequent intervals and kept in covered satisfactory containers. All waste should be removed from the canning center daily.

Protection from Flies and Other Vermin.--All windows, doors, and other openings to the outside should be screened for protection from flies. Screens



should fit tightly and be kept free from breaks. Removable screens of fine wire mesh are recommended; mosquito netting may be substituted if necessary. Screen doors should be self-closing. Canneries should be kept free from rats, roaches, and other pests.

Dust.--Every precaution should be taken to keep cannery free from dust as it may be a source of contamination. Curtains should not be used at windows as they collect dust.

Toilet Facilities.--Toilet and lavatory facilities should be provided. Toilet rooms should be separated by a satisfactory partition from food handling rooms in accordance with all sanitary regulations.

### Equipment

Equipment for a canning unit must be considered in relation to a specific plan of operation, since the kind and amount required depends on the methods used, the daily output desired, and the number of workers to be employed.

Certain items of equipment are essential irrespective of the type of operation. Before selecting any canning equipment a canner's catalogue, carrying a full line of equipment and supplies, should be consulted.

### Minimum Equipment For All Types of Community Canning Centers

#### Tables

Preparation: The recommended size is 3 feet wide, 10 feet long, and 34 inches high. The tops may be of masonite, waterproof plywood, inlaid linoleum, sheet metal, or tongue and grooved flooring, painted with a good grade of enamel paint. Unpainted wood top tables are difficult to keep clean and their use is not recommended. Refuse openings 6 inches in diameter are cut in the middle of the table top approximately 30 inches from each end. A molding made of three-fourth inch quarter round is assembled around edges of the table to prevent produce from falling off the table, and to eliminate the dripping of juices and water on the workers. A minimum of 30 inches of table space should be provided for each worker. For the most efficient arrangement workers should be placed on only one side and at both ends of the table. This arrangement facilitates the placing of unprepared produce on the table, the removal of prepared produce as well as refuse. When using a number of tables, it is advisable to place the vacant sides of two tables approximately 30 inches apart, directly opposite each other, and the additional tables should be placed in alignment to the floor plan.

Fill Table: The recommended size is 3 feet wide, 6 feet long, and 34 inches high. Construction should be the same as for preparation tables. Fill tables should be arranged in alignment with the exhaust box of equal length. A working space of 24 - 30 inches should be provided between the two units.

Sealer Tables: Sealer tables for mounting either electric or hand sealers should be of sturdy construction with a top size 3 feet wide, 3 feet long, and 32 - 36 inches high, depending on the type of machine used. Alignment so cans can be easily taken out of exhaust box.

## Tank

The most desirable type of tank for soaking, washing, blanching, and scalding produce is one made of metal, 2 feet wide, 2 feet deep, and six feet long. Discarded bath tubs may be used satisfactorily. (Wooden tanks may be used if available.) If wooden tanks are used extra care must be taken in cleaning. It is essential to provide adequate liquid capacity for all operations in which water is used. A separate tank or vat is desirable for each of the above preparation operations. Drains should be provided in the bottom of the tank, approximately 6 inches from one end for ease of cleaning. It is advisable to raise tanks 10 inches from the floor.

## Containers

Containers for unprepared and prepared fruits and vegetables should be dish pans of 14 - 16 quart size. Buckets or other deep containers are not desirable. One dish pan to 1 1/3 to 1 1/2 preparation workers will provide adequate containers.

Blanching Baskets of perforated steel, wire lined buckets or small tubs or buckets perforated with 3/8 inch holes or similar equipment with capacity of not more than 24 quarts are the most suitable type for canning plants.

Buckets of galvanized iron are desirable for general use.

Garbage and Trash Containers with capacity for a day's accumulation of refuse. These should be of metal or wood, water tight, and fitted with covers.

Containers for Salt and Sugar should be made of wood or earthen ware, having close fitting covers.

Pans. Shallow pans of approximately one quart liquid capacity are necessary for inspecting processed food. A minimum of 6 pans should be provided.

Spoons with long handle of heavy one piece construction used primarily for topping cans.

Cutting Boards of hard wood for general use.

Steam-proof Gloves of rubberized canvass or treated leather for handling hot cans and equipment. They should be loose fitting at the wrist so that they can be quickly removed in case of accident. Each canning unit should have a minimum of 6 pairs of gloves.

Clock. This should be a clock of sturdy construction. An inexpensive alarm clock is suitable.

Time Teller. Adjustable, of cardboard, or plywood to indicate the processing period. One should be provided for each pressure cooker or retort.

Cutlery. Tomato knives, peeling knives, coring hooks, and vegetable knives. This equipment should be of high quality carbon steel of an approved design. Stainless steel kitchen cutlery is not desirable, since it does not stand up under canning conditions.

Sharpening Equipment, abrasive type, emery wheel unit or oil stone should be provided for each canning unit.

Marking Equipment. Marking equipment sets should consist of the following equipment:

One pint of canners ink. Will make approximately 100,000 impressions.

Two sets of canners ink pads.

One set of <sup>62 point</sup>~~45~~ type or similar open-faced rubber type

One stamp holder, ~~circular~~.

Material for cleaning type:

One pint of alcohol.

One small stiff brush.

Cleaning Equipment, consisting of brooms, mops, squeegee, scrub brushes, scrub cloths, dish cloths and dish towels.

#### Thermometer

Canning Thermometer of the red liquid pocket type with temperature range of 0 degree to 220 degrees F is recommended. Every canning unit should have a minimum of 2 thermometers and two replacable graduated glass tubes.

#### Additional Desirable Equipment.

Maximum Registering Armored Thermometer (with temperature range of 0 degree F to 200 degrees F.) A thermometer of this type is used to check processing methods and exhaust box efficiency. This thermometer should be used only by a technically trained person.

Gauge Tester. A monometer is the most desirable type of gauge tester to use. Smaller portable type gauge testers are desirable, providing the master gauges are checked several times during the canning season with a monometer.

Vacuum Test Gauge is used to check the internal vacuum in a processed can.

Seam Micrometer is the only satisfactory accurate means of checking tightness and measurements of can seams. This gauge should be used only by a technically trained person. If this instrument is not available a 10-inch mill file can be satisfactorily used to cut the completed can seam. This is essential in order to inspect and measure the can seam.



Shovel. One of slatted construction with short D handle for handling root crops, apples, and blanching greens. Commercial name, screen scoop or potato scoop.

### Equipment for Steam Canning Units

The items listed below are considered as minimum essentials for steam canning units, in addition to the foregoing listed equipment:

Steam boilers to carry the required volume of steam. A 10 to 20 horsepower boiler will be needed, depending on the size of the unit. The boiler should have connections to retorts, hot water bath processing units, exhaust boxes, blanching and scalding vats, hot water tanks, pulpers and steam jacketed kettles. All boilers should be installed and inspected in conformance with State and local boiler installation and inspection codes.

Blanching and scalding vats should be equipped with steam heating facilities and drains. The liquid ratio of 5 gallons of water to one gallon of produce to be processed should be used for efficient operation.

Hot water or brine tank with a minimum capacity of 5 gallons heated with steam to provide boiling canning medium for filling cans.

Exhaust box of semi-commercial type with capacity for exhausting maximum number of cans to be processed daily. An exhaust box 3-feet x 4-feet can exhaust 1200 cans in a ten-hour day. An exhaust box 3-feet x 6-feet can exhaust 2000 containers in a 10-hour day.

Steam pressure retorts with total capacity for maximum daily output. Retorts should be piped with steam and water and equipped with thermometer, compound pressure gauge, safety valve, and 1/8 inch petcock. An automatic steam pressure control valve assembly should be incorporated in the steam feed line. Retorts of 100 quart can capacity or larger used for processing No. 3 cans should be equipped for pressure cooling. However, an experienced operator may process this size of container without pressure cooling. A number 3-retort can process 1200 number 3 cans of non-acid products in a 10-hour day. A number 2-retort can process 425 number 3 cans of non-acid products in a 10-hour day.

Water-bath canners with capacity of <sup>100</sup>20 to <sup>250</sup>25 quart cans for processing products by the boiling water methods. ~~These may be any containers with a good lid deep enough to permit covering cans with at least an inch of water. A wash boiler with lid makes a satisfactory small water bath canner. Any container used for water bath canning should be fitted with a false bottom which will allow circulation of water under the cans.~~

Hoist attached to track or crane for lifting cans into and out of retorts and cooling tanks.

Cooling tank for water-cooling tin cans after processing should have cold water connection entering the tank at the bottom and overflow opening at the top.

## Sealers

Electric sealer for units producing a maximum of 25,000 cans per year. This sealer can seal 300-cans per hour.

Single spindle semi-automatic closing machine for units producing 25,000 - 150,000 cans annually. This sealer can seal over 300-cans per hour.

## Trucks

Floor trucks for moving produce, cans, equipment, etc.

## Equipment for Pressure Cooking Using Gas, Wood, etc. For Heating Canning Equipment

The following is a list of minimum equipment.

Stove space sufficient for operating the required number of pressure cookers and water-bath canners and for other operations such as blanching, exhausting, and scalding.

The heating unit should supply sufficient heat to generate the required processing pressure in a minimum of five minutes. For large pressure retorts, it may be necessary to provide heavy duty gas or oil burners with a heating capacity of approximately 50,000 to 100,000 B.T.U. per hour. Combination retort stand and burner units are available for various sizes of semi-commercial retorts. A good coal range may be adequate, but is often undesirable because of the amount of heat radiated into the room. Outdoor and indoor furnaces burning wood may be successfully used, but are not generally recommended because of difficulty in maintaining an even heat.

Pressure cookers. Fourteen quart cans size pressure cookers or 33 quart cans size retorts of boiler plate, strongly constructed to stand up under constant use. They must be fitted with pressure gauge, safety valve, and petcock.

Water-bath canners with capacity of 20 to 25 quart cans for processing products by the boiling water methods. These may be any containers with a good lid, deep enough to permit covering cans with at least an inch of water. Covers should be provided to expedite heating. A wash boiler makes a satisfactory small water bath canner. Any container used for water bath canning should be fitted with a false bottom which will allow circulation of water under the cans.

Racks which fit pressure cookers to hold cans while they are being processed. A duplicate set of racks for each cooker is desirable. An additional retort basket should be supplied for the 33 quart size retort.

Container for heating canning medium. Stock pots or wash boilers equipped with faucets may be used for this purpose. It is desirable to have a container of at least 6 gallon capacity. The source of heat should be such as to keep canning medium boiling.

## Sealers

Sealing machine. (Heavy duty hand operated) are adequate for small units with a maximum annual production of 5,000 quarts. An operator can seal 33 cans per hour with this sealer.

Exhaust box for exhausting tin cans or small units should be of a minimum size, 3 feet wide, 4 feet long, and 10 inches deep, equipped with a false bottom. A unit of this size may be heated by gas burners, outdoor furnaces or coal range.



## Organization and Management of Work

Regardless of the type of canning unit operated, it will be necessary to make a careful analysis of the jobs to be done in order that the unit may be efficiently operated for quality and quantity production. Every effort should be made to organize and lay out the various jobs so that an orderly and continuous flow of work can be maintained.

The successful management of a canning unit is largely the responsibility of the supervisor who should in every instance set the work standards and determine the specific methods of all canning operations. Without careful guidance and control of all phases of canning operations there will be a waste of time and materials which will result in low production, excessive unit costs, and possible spoilage of canned products. To avoid waste of perishable materials before canning and to eliminate danger of spoilage after canning, it is necessary that work be scheduled so that all perishable foods are canned while fresh and in prime condition. This is particularly important in the case of non-acid vegetables.

The following must be considered in organizing the work, irrespective of the extent of operations and the methods used:

### Manager

1. Scheduling and coordinating deliveries of produce to be canned.
2. Checking mechanical and steam equipment.
3. Keeping records.
4. Receiving and checking produce.
5. Scheduling workers to give maximum efficiency to the community.

### Preparation

1. Washing cans for filling.
2. Preparing products for canning: washing, grading, peeling, cutting.

### Heat Treating

1. Blanching and scalding.
2. Filling cans.
3. Exhausting.
4. Sealing.
5. Marking cans.

### Processing

1. Processing.
2. Cooling.

### Checking Processed Containers

1. Storing cans for incubation period.
2. Observing during incubation for spoilage.

### Storage

1. Warehousing.

### Sanitary Precautions

1. Washing or otherwise cleaning equipment.
2. Disposing of waste.
3. Sterilizing refuse containers.
4. Cleaning and sterilizing working surfaces.
5. Cleaning and oiling equipment.
6. Cleaning floors.
7. Cleaning outside premises.

Weekly operations on a canning unit will consist of such jobs as checking and thorough cleaning of storerooms and cleaning windows, walls, and woodwork.

Supervisors should prepare work plans for each job. These should be simple and specific in order that workers may easily understand them. Assignment of jobs should be made in relation to the experience and ability of the workers. Time schedules should be prepared for operations where speed is important such as time between harvesting and delivery, between exhausting and processing, etc. These time-tables should be placed where workers can see them easily and appreciate their importance.

### Containers.

For the most efficient operation of a canning unit tin cans should be used. The advantage of the use of tin cans rather than glass jars are as follows:

1. The initial cost usually is less.
2. Heat penetration is generally faster, reducing the processing period.
3. Cans require less retort space, which means greater volume of production.
4. No loss of liquid occurs in processing tin cans.
5. Greater volume of production can be obtained as pressure cookers do not have to cool so long before opening to prevent breakage as with glass.
6. Tin cans may be quickly water cooled, thereby preventing over cooking.

7. Tin cans are less easily damaged in distribution. They are more easily handled than glass jars and require less warehousing space.

8. Tin cans prevent loss of color due to light exposure.

Container Suggestions. For best results use only the type of can listed opposite the product to be packed in the table below. There are three types of cans - plain cans, standard enameled cans, and C-enameled cans. In cases where two types of cans are listed opposite a product, use either kind but the containers listed in the first column are considered preferable.

Type plate means the particular tinplate used in the manufacture of the cans. Type L plate is used for corrosive products and insures a longer storage life, providing the product is packed properly and stored at reasonable temperatures. It is not as stiff as Type M plate, and therefore is not used for products processed under pressure. The corrosive products which require the use of L type of plate are processed at 212° F.

<u>Product</u>	<u>Recommended Container</u>	<u>Alternate Containers Used</u>	<u>Type Plate</u>
Apples	Plain		L or M
Blackberries	Sanitary Enamel		L
Peaches	Plain		M or L
Sauerkraut	Plain	Sanitary Enamel	L
Tomatoes	Plain		M
Beans, Green	Plain		M
Beets and Beet Tops	Sanitary Enamel	C-enameled	M
Carrots	C-enameled	Sanitary Enamel -	M
Corn, Cream style	C-enameled	(Plain)	M
Peas	C-enameled	Plain	M
Spinach and Other Greens	Plain		M

By correlating the products to be packed in any given plant with the information given in the above table, it should be possible to hold the inventory of cans to a minimum. Thus, the choice of containers for a given commodity will be governed not only by the properties of that product, but also by the type of containers that are available in stock for use with other products. It is advisable to choose the container that can be utilized for the greater number of products. In some cases, no alternate suggestions are given, but where they are presented, the above factors should be given consideration in ordering containers.

Cans are ordinarily limited to:

No. 2	(2 $\frac{1}{2}$ cups)	
No. 2 $\frac{1}{2}$	(3 $\frac{1}{2}$ cups)	
No. 3	(4 cups)	
No. 10	(13 cups)	For acid products only



Cans should be selected in accordance with any existing Federal regulations.

Proper sealing of tin cans depends in part on the gasket on the under side of the cover. Gaskets are of two types; paper and composition. The composition gasket is preferred as it is not easily damaged by handling. Paper gaskets must be handled carefully. They should not be removed from the can cover and should never be wet before the cans are sealed. If a paper gasket becomes broken, the cover must be discarded.

Glass Jars. While glass jars are commonly used for home canning, they are not the preferred container for use in community canning centers. It is recommended that their use be limited to the canning of acid products by the water bath process.

If it is necessary to use glass jars, the following precautions should be taken:

1. Only perfect jars should be used. Each jar should be carefully examined for chips at the rim which would prevent proper sealing and for cracks and flaws which might result in breakage.
2. Jars of non-tempered glass such as are commonly used for commercial salad dressings, pickles and jams should never be used for products processed under pressure.
3. Quart jars should be the largest size used for non-acid foods.
4. Only good quality jar rubbers should be used.
5. Lids, enclosures, and bands should be free of rust and defects.
6. Thread of the jars should be carefully checked to insure that they are of standard design. Glass jars may be tested for defects by holding the jar between your eyes and a light, as eggs are candled.
7. If the families have both glass and tin containers it will be best to use the glass for fruits and tomatoes that are processed in the water bath.

Housekeeping and Care of Equipment. For successful canning it is extremely important that a high standard of cleanliness be maintained. The canning process will not necessarily insure a safe product if the food becomes contaminated before it is canned. Experience has shown that the main sources of contamination are within the canning plant.

A. Cleaning and Care of Equipment. Special attention should be given to the care of equipment. Spoilage of canned food may often be traced to contamination due to carelessness in cleaning the equipment with which the food comes in contact. All equipment should be thoroughly cleaned at the end of each operating period and all equipment needing oil, oiled. Some equipment may require more frequent oiling. General directions for the cleaning and care of equipment are given on the following page. Special instructions given by the manufacturer for the care of mechanical equipment should be followed.

1. Mechanical equipment such as peelers, cutters, and filling equipment should be dismantled, scrubbed, and sterilized with steam after each operating period. Food material left in any part of the equipment may cause serious spoilage in the next batch of produce. It is advisable to flush all equipment with water for 15 to 20 minutes prior to starting the day's run.
2. Steam pipes should be set up so that they may be easily drained and cleaned. All dead ends should have drains. Circulating feeder pipes should be taken apart for cleaning purposes. Perforated steam supply pipes should be carefully blown out during the cleaning operation.
3. Wooden equipment and work tables should be scrubbed with hot soapy water, rinsed with clear hot water, and dried. Wooden equipment and surfaces with which food comes in contact should be treated with steam.
4. Metal top tables should be washed in hot soapy water, rinsed with clear hot water, and wiped dry. Mineral oil should be applied to the table tops to prevent rusting. Other oils, such as motor oil or cooking oil, should not be used as they will affect the flavor of food which comes in contact with the surface.
5. Metal utensils should be washed in hot soapy water, rinsed and then sterilized with steam, or by immersion in boiling water for 3 minutes, or by the use of a chlorine solution or other sterilizing agent. Utensils of corrosive metals such as iron, galvanized iron, and copper should be thoroughly cleaned immediately before as well as after use to remove the film of surface corrosion which is readily dissolved by many products.
6. Pressure cookers should be washed in hot soapy water, rinsed and dried. The lids should never be immersed in water, nor inverted, because condensed steam may run into the pressure gauge. The manufacturer's directions for the care of pressure gauges and safety valves should be followed.
7. Blanching and scalding water should be kept clean to reduce to a minimum the possibilities of bacterial contamination. Tanks and containers used for washing, blanching, and scalding should be thoroughly cleaned at the end of each day's run and more often if necessary.
8. Exhaust tanks and exhaust boxes should be cleaned thoroughly by water under pressure.
9. Retort clamp bolts and nuts should be cleaned and lubricated with a graphite grease.
10. Cutlery should be inspected for sharpness and all equipment sharpened, as needed. It should be stored in a wooden rack or cloth case, with pockets for each piece of equipment.
11. All pressure gauges should be tested at the beginning and at the middle of the canning season. It may be necessary to inspect them more often.

B. General Cleaning. A good standard of housekeeping requires that all rooms occupied by a canning unit be kept clean and in order at all times. This requires constant care on the part of all workers.

1. Floors should be free from litter and excess water. A thorough scrubbing or mopping is necessary at least once a day. In large steam canneries floors should be flushed with water during each shutdown period; that is, during meal hours and at the end of the day. A squeegee or heavy broom should be used to remove excess water.
2. Walls should be wiped down weekly to remove dust and washed as often as necessary to keep free from grime. Woodwork should be kept free from dust and finger marks. Provisions should be made for painting walls and woodwork as often as necessary to keep them in a sanitary condition.
3. Cupboards, shelves, and drawers should be well organized and kept in good order. They should be thoroughly cleaned at least once a week.
4. Frequent washing of windows is necessary because of the steamy atmosphere of canneries. Screens should be kept free from dust.

### Canning Operations

General information on the various operations in canning are:

Methods of Canning. There are two methods of canning which may be used. Steam pressure and boiling water bath.

1. Steam Pressure. By this method processing is done under pressure in steam retorts or pressure cookers. Higher temperatures can be obtained under pressure than can be reached by boiling. Non-acid vegetables and meats must be canned by this method since they require the intense heat that can only be obtained "under pressure" to destroy harmful micro-organisms.
2. Boiling Water Bath. By this method sealed filled cans are placed in a container of boiling water. The water should come at least an inch over the top of the cans. The water is kept boiling constantly during the processing period. This method may be used for acid fruits and vegetables only.

Selection of Food. For the best canning results it is essential that the produce be sound, fresh, and of the best stage for eating fresh. It should always be kept in mind that the quality of canned food can be no better than that of the raw material used.

It is highly desirable that the vegetables be canned on the day they are harvested. If it is necessary to hold produce overnight, it should be removed from crates or sacks and spread out in a cool, well ventilated room. The produce should not be washed before storing as moisture hastens spoilage.



Preparation of Food for Canning. All workers engaged in the preparation of produce should be trained to inspect and sort during every operation in order to assure a finished product of the best possible quality.

Produce to be canned should be thoroughly washed. It is important to remove every trace of soil since the most dangerous micro-organisms and those most difficult to kill, occur in the soil. Washing is important also to remove any spray residue that may be present.

Products should be graded for uniformity of size, ripeness, and color. For the best results green products should not be put in with ripe ones, or large with small sizes.

After the products are washed and graded, they should be peeled or pared, if necessary. All bruised or imperfect portions should be removed. Some fruits and vegetables are cut in pieces in order to facilitate packing and processing. Where large quantities of produce, such as apples and beets, are to be processed, mechanical peeling machines should be provided.

Preparation of Containers. All containers in which food is to be canned should be washed just before using.

Tin cans should be washed in clean hot water. Soap should not be used as the alkali it contains effects enamel linings. Covers should not be washed. They should be kept dry until placed on the cans since gaskets may be impaired by hot water.

Glass jars should be washed in hot soapy water and rinsed with clean hot water. They should be hot when filled in order to prevent breakage. It is not necessary to sterilize them as sterilization takes place during processing. Glass jars should be examined for imperfections and damage both before washing, and before filling. It is desirable to examine them by using a candling device.

Blanching. Most vegetables and fruits are heated by dipping in water or live steam before canning. This treatment is known as "blanching." In home canning this process is sometimes known as precooking.

Blanching is used to decrease the volume of the product so that it can be packed more solidly and well filled cans obtained. In some cases it removes disagreeable odors and flavors, and with certain vegetables it removes slime-forming substances.

Blanching may aid the retention of green color in vegetables depending upon the product and the temperature used. For example, spinach blanched at 170 degrees Fahrenheit retains its natural green color to a remarkable degree even when heated to 250 degrees Fahrenheit during processing. Blanching of spinach at a temperature above 170 degrees Fahrenheit results in loss of green color and also loss of nutrients.

Certain vegetables and fruits, such as tomatoes, peaches, and pears are scalded to loosen the skins so that they can be removed more easily. This is also a blanching process.

Filling Cans. After blanching, products should be packed immediately in the cans. The filling may be done with a mechanical filling machine or by hand. Fill the cans to the recommended headspace with boiling canning medium. Where skilled operators are not available and the canning medium is a brine it is recommended that the dry salt be placed in the can before filling with produce. The can is then filled with boiling water. This prevents spillage of the canning medium which will cause rusting and corrosion of machinery and equipment. The usual portion of salt is approximately  $1/2$  teaspoon to a No. 2 can and  $3/4$  teaspoon to a No. 2 $\frac{1}{2}$  can, and 1 teaspoon to a No. 3 can or quart jar.

Headspace is the space between the top of the can seam and the level of the can contents. The canning medium should be disregarded in measuring headspace which should be approximately  $5/16"$  to  $7/16"$  for the type of products recommended for canning. There should be sufficient space in the container to allow for expansion of the product during the processing. Slack filled cans contain too much air which may cause food discoloration, oxidation of top layer of food, internal rusting, and excess discoloration of the interior of the container. Cans should be weighed occasionally to prevent the general tendency of underfilling. It is not generally advisable to weigh each filled can.

Note: Net weight is the total weight of contents of the can including solids and canning medium.

Cut Out or Drained Weight, is the weight of the solid contents of a can after the product and canning medium have been separated. Weights for No. 3 and smaller cans of all products except tomatoes may be determined by turning the contents on a circular  $1/8$  mesh screen 8 inches in diameter, allowing two minutes draining time before weighing the remaining material. A screen 12 inches in diameter is used for cans larger than No. 3. A screen of  $1/2$  inch mesh is used for tomatoes.

Fill-in Weight is the weight of the solid content of the cans before canning medium is added and the container sealed. Fill-in weight should conform with the U. S. Department of Agriculture, Agricultural Marketing Service standards for grades of the product being processed.

Exhausting is the process of heating the contents of an unsealed container to a designated center temperature. This process is accomplished by the use of a continuous or batch type steam exhaust box or a batch type hot water exhaust box. The hot medium of a batch type hot water exhaust box should come within one inch of the top of the container. Lids are best placed loosely on glass jars when exhausting.

The primary purpose of exhausting is to expel air from the can and its contents. This prevents undue strain during processing, rusting of the interior of the can, oxidation and discoloration of produce. It creates a vacuum so that can ends will be concave after cooling. The higher the exhausting temperature the greater the vacuum within the can. The exhausting period varies with the type of products processed. In general non-acid products are exhausted to a center temperature of approximately  $160-180^{\circ}$  Fahrenheit and acid products to a center temperature of approximately  $135-145^{\circ}$  Fahrenheit.

Topping. Topping is the operation of removing excess materials from the rims of cans before sealing. Topping also applies to the operation of removing or adding some of the product from a container to secure the proper headspace after the exhausting period. It is advisable where possible to remove liquid instead of product to adjust headspace. An underfilled container is a waste.

Sealing. Containers should be sealed immediately after exhausted to prevent loss of heat. The "closing temperature" or exhausting center temperature which refers to the center temperature at the time the can is closed, is measured by inserting a thermometer at the center of the can contents. It should be in accordance with instructions given for specific products.

Since can sealing machines vary in construction it is important to follow the manufacturer's instructions for their operation. Sealers should be cleaned, oiled, and greased after each day's operation. The sealing roll adjustment should be checked and tested for tightness of seals at the beginning of each day's operation. Can seams should be inspected daily by the micrometer or file method of testing.

Glass jars are closed immediately after filling with blanched or precooked products. The rims should be wiped off to remove any food particles and the jar rubber and top put into place. The method of adjusting the tops varies with the type of jar used.

Screw top. If exhausting is needed to secure correct center temperature the top should be screwed down evenly and tightly, then given a quarter turn back ... after exhausting ... seal the jar before processing.

Self-sealing top. If the type of top which consists of a lid and screw band is used, first exhaust jar then place lid on and screw the band down tightly. If "economy" jars, on which the lid is held in place by a clamp, are used the clamp should be adjusted so that the lid is tight. The clamp is removed after processing and cooling. The sealing of these types of jars takes place during the processing by the action of heat on the composition.

Processing. Processing is the heat treatment given the product after the containers are closed in order to destroy micro-organisms which cause spoilage. It is accomplished by steam pressure in retorts or pressure cookers, or in boiling water baths. Processing should be started promptly after the cans are closed.

The timing is started when the desired processing temperature and pressure have been reached, not when the cans are placed in the retort or cooker. The time required to heat the closed retort to the designated temperature or to bring the water bath to the boiling point after putting in the cans is known as the "coming-up time." For the best results, the coming-up time should not be over five minutes. The time required for processing varies with the product, the size of the container, and the source of heat.

The times and temperatures recommended are based on the requirements at sea level. At this level water boils at 212 degrees Fahrenheit. As the altitude increases the temperature at which the water will boil decreases. Consequently, in canning at altitudes above sea level, it is necessary to make adjustments in pressure for steam pressure canning and in the processing time when the boiling water bath method is used.



In adjusting processing, temperature and time use the following:

For Fruits, Tomatoes

Be sure solid food is covered by liquid -- leave one-half inch headspace in each jar.

Processing times are given for sea level. If you are higher, add 1 minute for each 1,000 feet when processing time is 20 minutes or less. Add 2 minutes for each 1,000 feet when processing time is longer.

For Vegetables

Add 1 teaspoon salt to each quart when packed -- leave one-half inch headspace for non-starchy vegetables, 1 inch for starchy - corn, peas, lima beans. Be sure solid food is covered by liquid.

Time and pressure are given for sea level. If you are higher, use the time given but increase pressure one-half pound for each 1,000 feet.

When the steam pressure method of canning is used it is important that a constant pressure be maintained in order to avoid underprocessing which may result in spoilage, or overprocessing which will affect the texture and flavor of the finished product. An even temperature is necessary also to prevent loss of liquid from glass jars.

When canning by the boiling water bath method, it is essential that the water cover the cans completely and be kept boiling during the entire processing period. Start counting time when the water comes to a full and vigorous rolling boil. It may be necessary to add hot water during the processing period to maintain the proper level.

Cooling. At the completion of the processing period cans should be cooled as rapidly as possible to 100° Fahrenheit to prevent overcooking and flat sour spoilage.

Water cooling. This method should be used for cooling tin cans of No. 3 size and smaller. As the cans are taken from the cooker they are plunged immediately into a tank or other container of cold water. Only pure, clean, cool, running water should be used.

Pressure cooling. This method should be used for cooling non-acid foods in No. 10 cans. For community canning operations it is not necessary to pressure cool cans of No. 3 size or smaller.

Cooling glass jars. Glass jars should be removed from the cooker or retort immediately after the pressure gauge has returned to 0 pressure and after the processing period. If jars other than the self-sealing type are used, the seal should be completed at once. Glass jars should be cooled right side up in a place where there is free circulation of air. They should be kept out of draughts to avoid breakage. Jars should not touch each other while cooling. They should never be stacked or covered with cloth or paper before they are cold.

Marking cans. Each can should be marked so that it may be fully identified. The following information should be included:

Stamp )	1st line, name of product
Holder )	2nd line, date, symbol, or name of canning unit
Assembly )	3rd line, lot number or processing number
of type )	

Rubber stamping with canners' ink is recommended for marking tin cans. Glass jars may be marked by using hardware crayon or similar wax crayon.

Can Content Identification. Cans may be marked to identify contents as indicated below:

Apple Sauce	APLSA
Apples Sliced	APPLE
Apricots	APCOT
Asparagus	ASPAR
Beans, String	SBEAN
Beans, Shelled	SHBEAN
Beets	BEETS
Blackberries	BLACKB
Carrots	CAROT
Cherries	CHERRY
Corn	CORN
Fish	FISH
Pears	PEARS
Peas	PEAS
Plums	PLUMS
Raspberries	RASPB
Sauerkraut	KRAUT
Swiss Chard	CHARD
Tomato Juice	TOMJU
Tomato Pulp	TOMPL
Tomato	TOMATO
Turnip Greens	GREENS

Note: Rubber type should be procured in strips as indicated above for each kind of produce to be canned on any one unit.

Cleaning Equipment, consisting of brooms, mops, mop parts, squeegees, scrub brushes, scrub cloths, dish cloths, dish towels.

Equipment for Steam Canning Units: The items listed below are considered as minimum essentials for steam canning units, in addition to the foregoing listed equipment.

Steam boilers to carry the required volume of steam. A 10 to 20 horsepower boiler will be needed, depending on the size of the unit. The boiler should have connections to retorts, hot water bath processing units, exhaust boxes, blanching and scalding vats, hot water tanks, pulpers, and steam jacketed kettles. All boilers should be installed and inspected in conformance with State and local boiler installation and inspection codes.

Incubation. Before canned goods are stored they should be inspected daily for at least a week for indications of spoilage. This period, which is known as the "incubation period," allows time for action of any micro-organisms which may not have been destroyed by processing. Spoilage in tin cans is indicated by bulging of the ends or leakage at the seams. Leakage of glass jars is an indication of spoilage.

Cans should be stacked, preferably horizontally, in racks so they may be examined easily. A uniform temperature of 60° Fahrenheit to 70° Fahrenheit should be maintained during the incubation period. If no signs of spoilage appear within the designated time cans may then be stored with the assurance that little, if any, spoilage will develop.

Warehousing. Canned products should be stored in a cool, dry place with an average temperature of not more than 70° Fahrenheit. Temperature and humidity should be as constant as possible, otherwise sweating and subsequent rusting of tin cans may result. Special attention should be given to storage temperatures in those States where the average climatic temperature is relatively high. In severe climates precautions should be taken to prevent freezing of canned goods.